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HDP/SB/21 based on PTO/SB/21 (08-00)

TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	10/672,290
Filing Date	September 26, 2003
First Named Inventor	Johann Borenstein et al.
Group Art Unit	2837
Examiner Name	Rina I. Duda
Attorney Docket Number	2115-001857/CPB

Total Number of Pages in This Submission

ENCLOSURES (check all that apply)

- ☐ Fee Transmittal Form
 - ☐ Fee Attached
- ☐ Amendment / Response
 - ☐ After Final
 - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☒ Information Disclosure Statement
- ☐ Certified Copy of Priority Document(s)
- ☐ Response to Missing Parts/ Incomplete Application
 - ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53

- ☐ Assignment Papers (for an Application)
- ☐ Drawing(s)
- ☐ Licensing-related Papers
- ☐ Petition
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s) _____

- ☐ After Allowance Communication to Group
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☐ Appeal Communication to Group (Appeal Notice, Brief, Reply Brief)
- ☐ Proprietary Information
- ☐ Status Letter

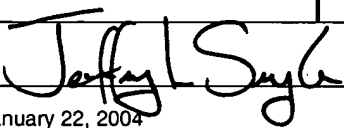
☒ Other Enclosure(s)
(please identify below):

Form HDP-1449 (Based on PTO-1449 - 5 pages); a copy of each of seventeen (17) Other Documents; and postcard.

Remarks

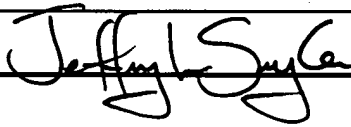
The Commissioner is hereby authorized to charge any additional fees that may be required under 37 CFR 1.16 or 1.17 to Deposit Account No. 08-0750. A duplicate copy of this sheet is enclosed.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

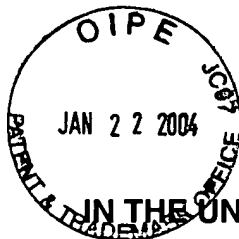
Firm or Individual name	Harness, Dickey & Pierce, P.L.C.	Attorney Name Stanley M. Erjavac Jeffrey L. Snyder	Reg. No. 38,442 44,672
Signature			
Date	January 22, 2004		

CERTIFICATE OF MAILING/TRANSMISSION

I hereby certify that this correspondence is being deposited with the United States Postal Service as express mail in an envelope addressed to: Director of the U.S. Patent and Trademark Office, P.O. Box 1450, Alexandria, VA 22313-1450, or facsimile transmitted to the U.S. Patent and Trademark Office on the date indicated below.

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Signature		Date	January 22, 2004

EV 406 075 847 US



PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.: 10/672,290
Filing Date: September 26, 2003
Applicant: Johann Borenstein et al.
Group Art Unit: 2837
Examiner: Rina I. Duda
Title: INTEGRATED, PROPORTIONALLY CONTROLLED,
AND NATURALLY COMPLIANT UNIVERSAL JOINT
ACTUATOR WITH CONTROLLABLE STIFFNESS
Attorney Docket: 2115-001857/CPB

Director of the United States Patent and Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Sir:

Pursuant to 37 C.F.R. §§ 1.56, 1.97 and 1.98, Applicant hereby submits an Information Disclosure Statement for consideration by the Examiner.

I. LIST OF PATENTS, PUBLICATIONS, AND OTHER INFORMATION

The patents, publications and other information requested to be considered by the Office (except unpublished U.S. patent applications) are listed on Form 1449 attached hereto.

II. COPIES

A. X Submitted herewith is a legible copy of (i) each U.S. patent application publication and U.S. and foreign patent; (ii) each publication or that portion which caused it to be listed; (iii) for each cited pending U.S. application, the application specification including the claims, and any drawing of the application which caused it to be listed including the claims directed to that portion; and (iv) all other information or that portion which caused it to be listed.

B. X Any patents, publications or other information which are listed on Form 1449 or on the copies of PTO-892, but which are not enclosed herewith, were previously cited by or submitted to the PTO in one of the following applications which has been relied upon for an earlier filing date under 35 U.S.C. § 120:

U.S. Serial Number
09/821,867
10/318,452

U.S. Filing Date
3/30/01 (issued 1/28/03 as Pat. No. 6,512,345)
December 12, 2002

C. X Because the present application was/is being filed after June 30, 2003, no copies of the U.S. patents or U.S. patent application publications which are listed on the attached Form 1449 are enclosed pursuant to the waiver of 37 C.F.R. § 1.98(a)(2)(i). Any foreign patent documents or non-patent literature listed on the attached Form 1449 are enclosed herewith.

D. ____ This is a PCT application in the entry of the National Phase in the United States. A copy of the International Search Report is attached for the Examiner's information. The documents listed on the International Search Report are listed on the attached Form-1449 for consideration by the Examiner and for listing on any patent resulting from this application. Since the International Search Report was from the US, EPO, or JPO search authorities, copies of these references should have been supplied to the USPTO under the trilateral agreement and are believed to be in the file of the above-identified application. (MPEP 1893.03(g))

III. CONCISE EXPLANATION OF THE RELEVANCE (check at least one box)

A. X Except as may be indicated below in (B), all of the patents, publications or other information are in the English language (concise explanation not required).

B. ____ A concise explanation of the relevance of each patent, publication or other information listed that is not in the English language is as follows (see 37 C.F.R. § 1.98(a)(3)):

1. ____ See the attached foreign patent office communication from a counterpart foreign application:
2. ____ English translations are provided:
3. ____ Other:

C. ____ The following additional information is provided for the Examiner's consideration.

IV. CROSS REFERENCE TO RELATED APPLICATION(S)

A. X The Examiner is advised that the following co-pending application(s) contain(s) subject matter that may be related to the present application. By bringing this(these) application(s) to the Examiner's attention, Applicant(s) does(do) not waive the confidentiality provisions of 35 U.S.C. § 122.

Serial No.
09/821,867
10/318,452

<u>Filing Date</u>	<u>Art Unit</u>
3/30/01 (issued 1/28/03 as Pat. No. 6,512,345)	
December 12, 2002	2837

V. THIS IDS IS BEING FILED UNDER

A. X **37 C.F.R. § 1.97(b):** (check only one box)

1. ____ within three months of the filing date of a national application other than a continued prosecution application under § 1.53(d) (37 C.F.R. § 1.97(b)(1)). No fee or certification is required.
2. ____ within three months of the date of entry of the national stage as set forth in §1.491 in an international application (37 C.F.R. § 1.97(b)(2)). No fee or certification is required.
3. X before the mailing of a first Office Action on the merits (37 C.F.R. § 1.97(b)(3)). No fee or certification is required. In the event that a first Office Action on the merits has been issued, please consider this IDS under 37 C.F.R. § 1.97(c) and see the certification under 37 C.F.R. § 1.97(e) below; or, if no certification has been made, charge our deposit account a fee in the amount of \$180.00 as required by 37 C.F.R. § 1.17(p).
4. ____ before the mailing of a first Office Action after the filing of a request for continued examination under 37 C.F.R. § 1.114. No fee or certification is required.

B. ____ **37 C.F.R. § 1.97(c):** (check only one box)

before the mailing date of either any Final Office Action under 37 C.F.R. § 1.113, a Notice of Allowance under 37 C.F.R. § 1.311, or an action that otherwise closes prosecution.

1. ____ No certification; therefore, a fee in the amount of \$180.00 is required by 37 C.F.R. § 1.17(p).
2. ____ See the certification below. No fee is required.

C. ____ **37 C.F.R. § 1.97(d):**

after the mailing date of either a Final Office Action under 37 C.F.R. § 1.113 or a Notice of Allowance under 37 C.F.R. § 1.311, yet on or before payment of the issue fee.

1. ____ See the certification below. A fee in the amount of \$180.00 is required by 37 C.F.R. § 1.17(p).

VI. CERTIFICATION UNDER 37 C.F.R. § 1.97(e): (check only one box)

The undersigned hereby certifies that:

A. ☐ each item of information contained in this IDS was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this IDS (See 37 C.F.R. § 1.97(e)(1)). See further statement under 37 C.F. R. 1.704(d) below in section VII, if applicable; or

B. ☐ no item of information contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned after making reasonable inquiry, no item of information contained in this IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this IDS (See 37 C.F.R. § 1.97(e)(2)).

C. ☐ Some of the items of information were first cited in a communication from a foreign patent office. As to this information, the undersigned hereby certifies that each item of information contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this IDS. As to the remaining information, the undersigned hereby certifies that no item of this remaining information contained in this IDS was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the undersigned after making reasonable inquiry, no item of information contained in this IDS was known to any individual designated in 37 C.F.R. § 1.56(c) more than three months prior to the filing of this IDS.

VII. STATEMENT UNDER 37 CFR 1.704(d)

The undersigned hereby states that:

☐ each item of information contained in this IDS was cited in a communication from a foreign patent office in a counterpart application and this communication was not received by any individual designated in 37 C.F.R. § 1.56(c) more than thirty days prior to the filing of this IDS.

VIII. PAYMENT OF FEES (check only one box)

A. ☐ A check in the amount of \$180.00 is enclosed for the above-identified fee.

B. ☐ Please charge Deposit Account No. 08-0750 in the amount of \$180.00 for the above-indicated fee. A duplicate copy of this paper is attached.

The above references are being cited only in the interest of candor and without any admission that they constitute statutory prior art, contain matter which anticipates the invention, or which would render the same obvious, either singly or in combination, to a person of ordinary skill in the art. Furthermore, this Information Disclosure Statement shall not be construed as a representation that a search has been made.

If it is determined that this IDS has been filed under the wrong rule, the PTO is requested to consider this IDS under the proper rule (with a petition if necessary) and charge the appropriate fee to Deposit Account No. 08-0750.

Please charge any additional fees or credit any overpayment pursuant to 37 C.F.R. § 1.16 or § 1.17 to Deposit Account No. 08-0750.

Respectfully submitted,

Dated: Jan. 22, 2004

By: Jeffrey L. Snyder
Stanley M. Erievac, Reg. No. 38,442
Jeffrey L. Snyder, Reg. No. 43,141

HARNESS, DICKEY & PIERCE, P.L.C.
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JLS/smb

FORM HDP-1449 (Based on Form PTO-1449)

**PATENT AND TRADEMARK OFFICE
INFORMATION DISCLOSURE CITATION**

(Use several sheets if necessary)

Sheet 1 of 5

ATTORNEY DOCKET No.

2115-001857/CPB

SERIAL No.

10/672,290

APPLICANT

Johann Borenstein et al.

FILING DATE

September 26, 2003

GROUP

2837

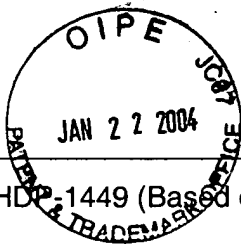
U.S. PATENT DOCUMENTS

Ref. Desig.	Examiner's Initials	Document Number	Date	Name	Class/ Subclass	(If appropriate) Filing Date
1.		4,527,650	07/1985	Bartholet		
2.		4,738,583	04/1988	Macconochie et al.		
3.		4,872,524	10/1989	O'Connor		
4.		4,932,831	6/1990	White et al.		
5.		5,145,130	09/1992	Purves		
6.		5,255,753	10/1993	Nishikawa et al.		
7.		5,257,669	11/1993	Kerley et al.		
8.		5,351,626	10/1994	Yanagisawa		
9.		5,351,773	10/1994	Yanagisawa		
10.		5,363,935	11/1994	Schempf et al.		
11.		5,423,708	06/1995	Allen		
12.		5,644,204	07/1997	Nagle		
13.		5,758,734	06/1998	Hong et al.		
14.		5,807,011	09/1998	Hong et al.		
15.		5,857,533	01/1999	Clewett		
16.		6,068,073	05/2000	Roston et al.		
17.		6,105,695	08/2000	Bar-Cohen et al.		
18.		6,113,343	09/2000	Goldenberg et al.		
19.		6,484,601	11/2002	Arrichiello		
20.		6,512,345	1/2003	Borenstein et al.		

Examiner:

Date Considered:

EXAMINER: Please initial if citation considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



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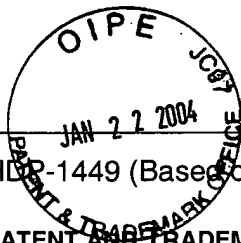
OTHER DOCUMENTS (including Author, Title, Date, Pertinent Pages, etc.)

Ref. Desig.	Examiner's Initials	
1.		"A Safer Way to Search Disaster Sites" by Jennifer Weston, IEEE Robotics & Automation Magazine, September 2000, Pg. 56-57.
2.		"Design and Motion Planning of a Mechanical Snake" by Yanson Shan and Yoram Koren, IEEE Transactions on Systems, Man, and Cybernetics, Vol. 23, No. 4, July/August 1993, Pg. 1091-1100.
3.		"Design of In-Pipe Inspection Vehicles for >25, >50, >150 Pipes" by Shigeo Hirose, Hidetaka Ohno, Takeo Mitsui, Kijichi Suyama, IEEE International Conference on Robotics & Automation, Detroit, MI May 1999, Pg. 2309-2314.
4.		"Limbless Locomotion: Learning to Crawl" by Kevin Dowling, IEEE International Conference on Robotics & Automation, Detroit, MI May 1999, Pg. 3001-3006.
5.		"Limbless Locomotion: Learning to Crawl with a Snake Robot" by Kevin J. Dowling, Advised by William L. Whittaker, December 1997.
6.		"GMD-SNAKE2: A Snake-Like Robot Driven by Wheels and a Method for Motion Control" by Bernhard Klaassen, Karl L. Paap, IEEE International Conference on Robotics & Automation, Detroit, MI May 1999, Pg. 3014-3019.
7.		"Biomimetic Design and Fabrication of a Hexapedal Running Robot" by Jonathan E. Clark, Jorge G. Cham, Sean A. Bailey, Edward M. Froehlich, Pratik K. Nahata, Robert J. Full, Mark R. Cutkosky, IEEE International Conference on Robotics & Automation, Seoul, Korea, May 21-26, 2001, Pg. 3643-3649.
8.		"Design and Simulation of a Cockroach-Like Hexapod Robot", by G.M. Nelson, R.D. Quinn, R.J. Bachmann, W.C. Flannigan, IEEE International Conference on Robotics and Automation, Albuquerque, New Mexico, April 1997.

Examiner:

Date Considered:

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Sheet 3 of 5

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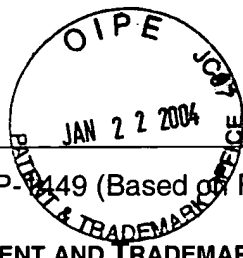
U.S. PATENT DOCUMENTS

Ref. Desig.	Examiner's Initials	Document Number	Date	Name	Class/ Subclass	(If appropriate) Filing Date
9.		"Design and Control of a Mobile Robot With an Articulated Body" by Shigeo Hirose, Akio Morishima, The International Journal of Robotics Research, Vol. 9, No. 2, April 1990, Pg. 99-113.				
10.		"Controlling a Multijoint Robot for Autonomous Sewer Inspection" by K.-U. Scholl, V. Kepplin, K. Berns, R. Dillmann, IEEE International Conference on Robotics & Automation, San Francisco, CA April 2000, Pg. 1701-1706.				
11.		"PackBot" Man Portable Tracked Ground Vehicle, iRobot Corporation, http://www.irobot.com/rd/p08_PackBot.asp , 1/15/2003, 4 pages.				
12.		"Remotec Andros", Remotec, Inc., http://www.remotec-andros.com/ , 1/22/2003, 9 pages.				
13.		"Cooperative Robot (Gunryu) Composed of Autonomous Segments," http://mozu.mes.titech.ac.jp/research/colony/gr/gr.html , 1/21/2003, 6 pages.				
14.		"Connected Crawler Vehicle for Inspection (Souryu I, II)", http://mozu.mes.titech.ac.jp/research/snake/soryu/index.html , 1/21/2003, 3 pages.				
15.		"Millibot Trains for Enhanced Mobility" H. Benjamin Brown, Jr., J. Michael Vande Weghe, Curt A. Bereton, and Pradeep K. Khosla, IEEE/ASME Transactions on Mechatronics, Vol. 7, No. 4, December 2002, Pg. 452-461.				
16.		"Development of Mobile Inspection Robot for Rescue Activities: MOIRA" by Koichi Osuka and Hiroshi Kitajima, Proceedings of the 2003 IEEE/RSJ Intl. Conference on Intelligent Robots and Systems, Las Vegas, Nevada, October 2003, Pg. 3373-3377				
17.		"Modeling, Identification, and Control of a Pneumatically Actuated, Force Controllable Robot" by James E. Bobrow and Brian W. McDonell, IEE Transactions on Robotics and Automation, Vol. 14, No. 5, October 1998, Pg. 732-742.				
18.		"Towards High-Speed, Motion Control of Pneumatic Actuators With Low-Cost Valves" by W. Brockmann and J. Kohne, 4th Int. Conference on Climbing and Walking Robots CLAWAR, Karlsruhe, Germany 2001, Pg. 339-346.				
19.		"An Experimental Comparison Between Several Pneumatic Position Control Methods" by S. Chillari, S. Guccione and G. Muscato, Proceedings of the 40th IEEE Conf. on Decision and Control, Orlando, Florida, December 2001, Pg. 1168-1173.				

Examiner:

Date Considered:

EXAMINER: Please initial if citation considered, whether or not citation is in conformance with MPEP 609. Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.



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U.S. PATENT DOCUMENTS

Ref. Desig.	Examiner's Initials	Document Number	Date	Name	Class/ Subclass	(If appropriate) Filing Date
20.		"A Tele-Operated Semi-Intelligent Climbing Robot For Nuclear Applications" by S. Glat, B.L. Luk, D.S. Cooke and A.A. Collie, Department of Electrical and Electronic Engineering, University of Portsmouth, Portsmouth Technology Consultants Ltd, Havant, England, 1997 IEEE, Pg. 118-123.				
21.		"Introduction to Robotics" Addison-Wesley Publishing Company, Inc. 1989, Pg. 226-235.				
22.		"Application of a Maximum Stiffness Rule for Pneumatically Driven Legs of a Walking Robot" by Grzegorz Granosik and Edward Jezierski, Proc. of 2nd Int. Conference on Climbing and Walking Robots, Portsmouth, UK 1999, Pg. 213-218.				
23.		"The Selection of Mechanical Actuators Based on Performance Indices" by J.E. Huber, N.A. Fleck and M.F. Ashby, Proc. of the Royal Society of London, Series A. 453, UK 1997, Pg. 2185-2205.				
24.		"Optimization of the Control Parameters of a Pneumatic Servo Cylinder Drive Using Genetic Algorithms" by Yong-Soo Jeon, Chung-Oh Lee, and Ye-Sun Hong, Control Eng. Practice, 1998, Vol. 6, Pg. 847-853.				
25.		"A Linear Time Varying Model for On-Off Valve Controlled Pneumatic Actuators" by C. Kunt and R. Singh, Transactions of the ASME, Journal of Dynamic Systems, Measurement and Control, 1990, Vol. 112, Pg. 740-747.				
26.		"An Analysis of a Pneumatic Servo System and Its Application to a Computer-Controlled Robot" by S. Liu and J.E. Bobrow, Transactions of the ASME, Journal of Dynamic Systems, Measurement and Control, 1988, Vol. 110, Pg. 228-235.				
27.		"Practical Design of a Sliding Mode Controller for Pneumatic Actuators" by S.R. Pandian, Y. Hayakawa, Y. Kanazawa, Y. Kamoyama, S. Kawamura, Transactions of the ASME, Journal of Dynamic Systems, Measurement and Control, 1997, Vol. 119, No. 4, Pg. 666-674.				
28.		"Comparison Between Linear and Nonlinear Control of an Electropneumatic Servodrive" by E. Richard and S. Scavarda, Transactions of the ASME, Journal of Dynamic Systems, Measurement and Control, 1996, Vol. 118, Pg. 245-252.				
29.		"Study of Pneumatic Processes in the Continuous Control of Motion With Compressed Air I, II," by J.L. Shearer, Transactions of the ASME, February 1956, Pg. 233-249.				

Examiner:

Date Considered:

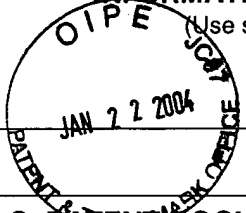
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Sheet 5 of 5



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U.S. PATENT DOCUMENTS

Ref. Desig.	Examiner's Initials	Document Number	Date	Name	Class/ Subclass	(If appropriate) Filing Date
30.		"Position Control of a Pneumatic Rodless Cylinder Using Sliding Mode M-D-PWM Control the High Speed Solenoid Valves" by M.C. Shih and M.A. Ma, JSME International Journal, Series C, 1998, Vol. 41, No. 2, Pg. 236-241.				
31.		"Continuous Sliding Mode Control of a Pneumatic Actuator" by B.W. Surgenor and N.D. Vaughan, Transactions of the ASME, Journal of Dynamic Systems, Measurement and Control, Sept. 1997, Vol. 119, Pg. 578-581.				
32.		"Accurate Position Control of a Pneumatic Actuator Using On/Off Solenoid Valves" by R.B. vanVarseveld and G.M. Bone, IEEE/ASME Transactions on Mechatronics, 1997, Vol. 2, No. 3, Pg. 195-204.				

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Date Considered:

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